Regency® COMMUNICATIONS INC.

SERVICE MANUAL

CTCSS ENCODE ONLY

MODEL MA-121

1227 S. PATRICK DR.
SATELLITE BEACH, FLA.

7001-4008-100

PRINTED IN U.S.A.

1-80

INDEX

I. INSTALLATION INSTRUCTIONS (CTCSS ENCODE ONLY FIELD INSTALLATION KIT)

A. General

B. Installation Instructions in MICRO-COM U11, U12, U14, U11H, U12H, U14H, U01, U04

C. Instructions for Installation in MICRO-COM U11B, U14B

D. Instructions for Installation in BTH-201B

II. MA-121 Tone Squelch (CTCSS) Option

A. General Description

B. Circuit Description

C. Tone Setting Instructions

D. Install Jumpers for the Proper Band

E. Tone Setting Precautions

F. Block Diagram (Fig. 6)

G. Schematic (504-336)

H. Parts Placement, Parts Overlay

I. Schematic (Rev. C board -604-017)

J. Parts Placement, Parts Overlay (Rev. C board)

K. Parts List

MA-121

INSTALLATION INSTRUCTIONS

CTCSS ENCODE ONLY FIELD INSTALLATION KIT

WARNING! Take care to install the tone board properly. Refer to either Fig. 1, 2 or 5 for proper orientation.

A. GENERAL

This kit consists of a single circuit board intended for installation in the following Regency Transceiver models. In performing this installation, it will be helpful to have the referenced service manuals.

1. MICRO-COM U11, MICRO-COM U12 and MICRO-COM U14 (publication SM-10-843)
2. MICRO-COM U11H, MICRO-COM U12H and MICRO-COM U14H (publication SM-10-843, plus High Band Addendum)
3. MICRO-COM U01 and MICRO-COM U04 (publication SM-10-843, plus Low Power Addendum)
4. MICRO-COM U11B, MICRO-COM U14B (publication SM-40-045)
5. BTH-201B (publication SM-10-388) NOTE: This CTCSS kit is only applicable on BTH-201B Base Stations produced after October, 1975. These can be identified by noting the microphone connector. Those with a five pin connector will accept the MA-166 kit.)
6. MICRO-COM U10R (publication 7001-4001-100) NOTE: Theory of operation, installation, adjustment, etc. of CTCSS modules in this repeater are discussed in its service manual and in addenda thereto.

B. INSTALLATION INSTRUCTIONS FOR INSTALLATION IN:

MICRO-COM U11
MICRO-COM U12
MICRO-COM U14
MICRO-COM U11H
MICRO-COM U12H
MICRO-COM U14H
MICRO-COM U01
MICRO-COM U04

1. Remove the transceiver from its case, and remove the loudspeaker with its brackets.
2. The shield area that accepts the CTCSS module is located in the transmitter portion, toward the front of the radio. The receptacle for the tone board is located in this shielded area. Refer to Figure 1.
3. Plug the tone board into the receptacle.
   NOTE: The following instructions assume that the tone board has been adjusted to the proper CTCSS frequency. If this is not so, carry out the adjustments outlined under the "Tone Frequency Setting Adjustments" section before proceeding.

4. Adjustment Procedure (Setting Tone Modulation Deviation)

   Adjust R618, on the tone encode board to obtain a tone modulation deviation of plus and minus 500 Hz. Then, insert a 100 millivolt, 1,000 Hz tone into pin four of the microphone jack, and adjust R240, (the transmitter deviation control on the transceiver) to obtain plus and minus 5 KHz peak modulation deviation. If R240 was changed much, remove the 1,000 Hz tone, and readjust R618 to obtain a tone squelch modulation deviation of plus and minus 500 Hz.

5. Fasten the loudspeaker back in place, and put the transceiver back in its case.

C. INSTRUCTIONS FOR INSTALLATION IN:

MICRO-COM U11B
MICRO-COM U14B

1. Remove the transceiver from its case.

2. The shield area that accepts the CTCSS module is located in the transmitter portion, toward the right rear of the radio. The receptacle for the tone board is located in this shielded area. Refer to Figure 3.

3. Plug the tone board into the receptacle.
   NOTE: The following instructions assume that the tone board has been adjusted to the proper CTCSS frequency. If this is not so, carry out the adjustments outlined under the "Tone Frequency Setting Adjustments" section before proceeding.

4. Adjustment Procedure (Setting Tone Modulation Deviation)

   Adjustment R618, on the tone encode board to obtain a tone modulation deviation of plus and minus 500 Hz. Then, insert a 100 millivolt, 1,000 Hz tone into pin four of the microphone jack, and adjust R240, (the transmitter deviation control on the transceiver) to obtain plus and minus 5 KHz peak modulation deviation. If R240 was changed much, remove the 1,000 Hz tone, and readjust R618 to obtain a tone squelch modulation deviation of plus and minus 500 Hz.

5. Put the transceiver back in its case.

D. INSTRUCTIONS FOR INSTALLATION IN:

BTH-201B NOTE: These instructions are for installing the MA-121 in BTH-201B models manufactured after October, 1975. These units may be identified by noting the microphone connector. Those with a five pin connector will accept the MA-121 kit.

1. Remove the transceiver from its case.

2. The connector that accepts the tone encode circuit board is shown in Figure 5.

3. If a shorting jumper connector is present on pins J and L of the tone board receptacle (pins J and L are at one end of the connector). Remove this shorting jumper. In radios not equipped with tone, this jumper serves the purpose of providing a path for the receiver audio. (Pins J and L on the tone encode board are connected together, and therefore maintain this path when the encoder is plugged in.)

4. Plug the tone encode circuit board into the receptacle.
   NOTE: The following instructions assume that the tone board has been adjusted to the proper CTCSS frequency. If this is not so, carry out the adjustments outlined under the "Tone Frequency Setting Adjustments" section before proceeding.

5. Adjustment Procedure (Setting Tone Modulation Deviation)

   Adjust R618, on the tone encode board to obtain a tone modulation deviation of plus and minus 500 Hz. Then, insert a 100 millivolt, 1,000 Hz tone into pin four of the microphone jack, and adjust R228, the transmitter deviation control to obtain plus and minus 5 KHz peak modulation deviation. If R228 was changed much, remove the 1,000 Hz tone, and readjust R618 to obtain a tone squelch modulation deviation of plus and minus 500 Hz.

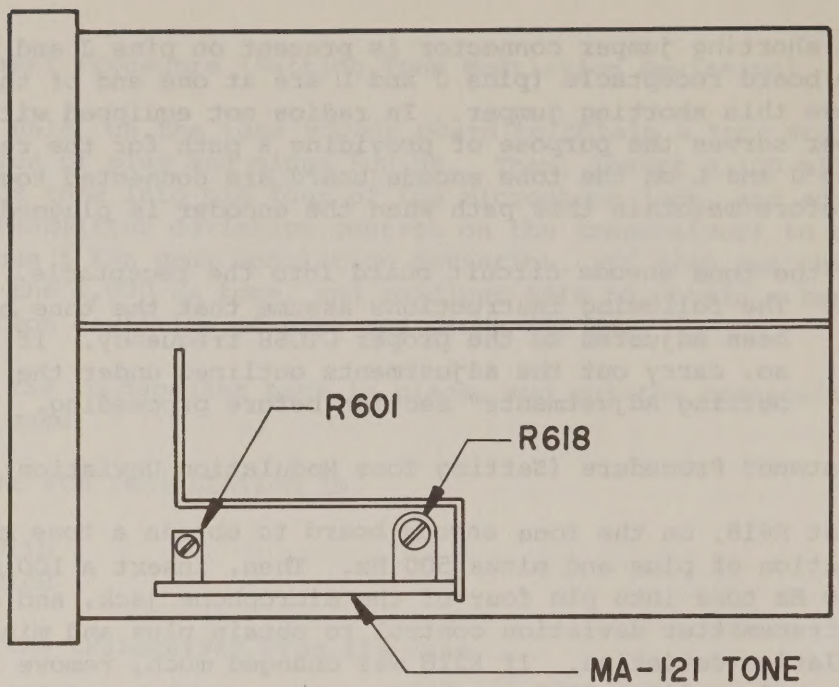


FIG 1

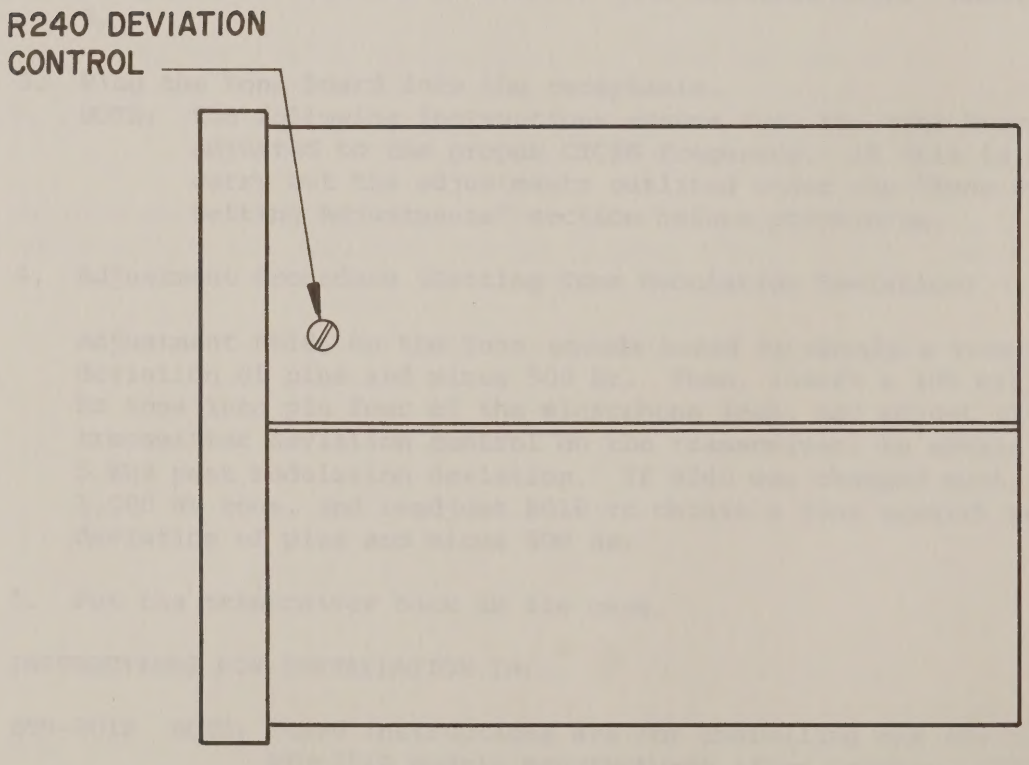


FIG 2

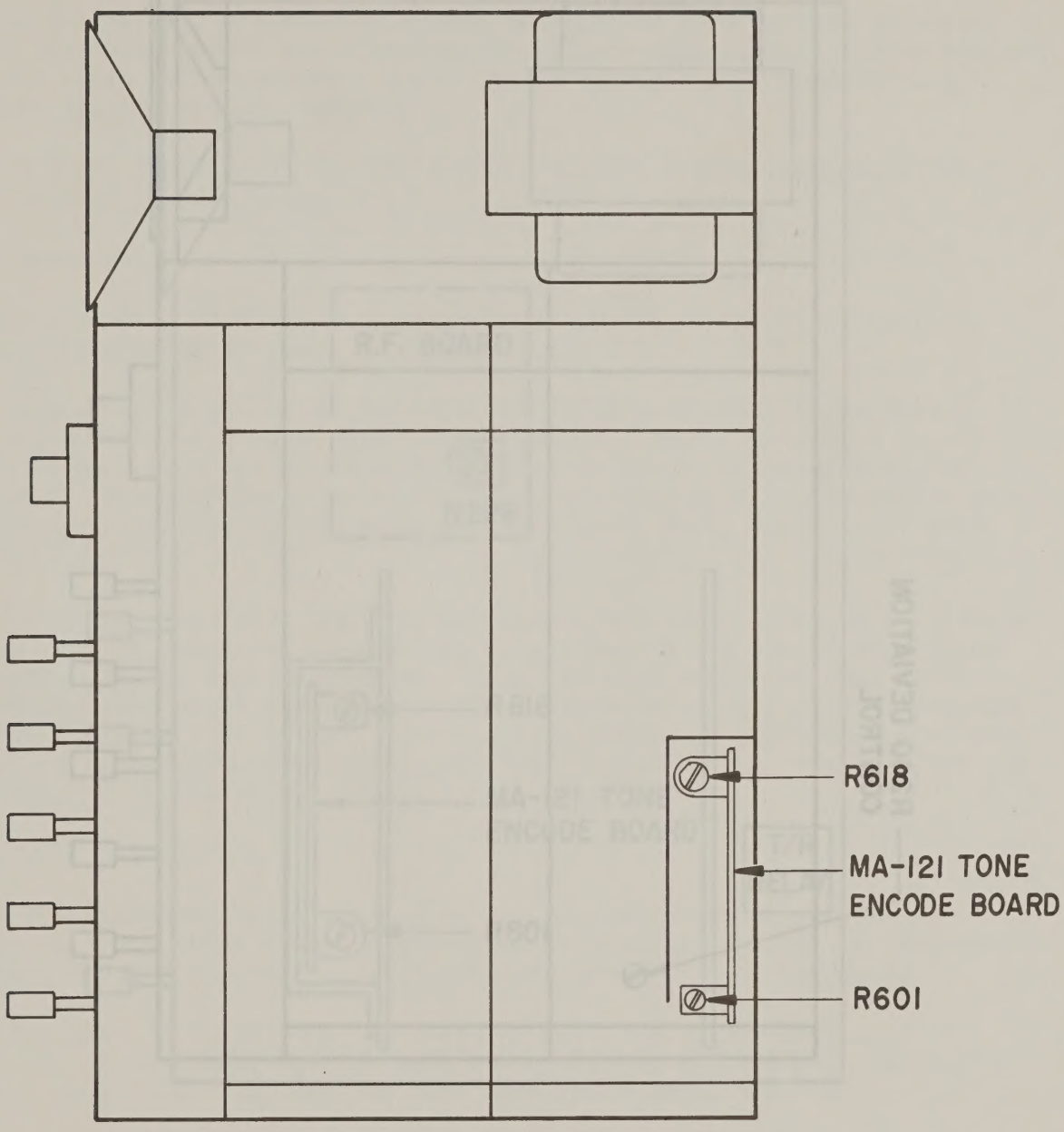


FIG 3

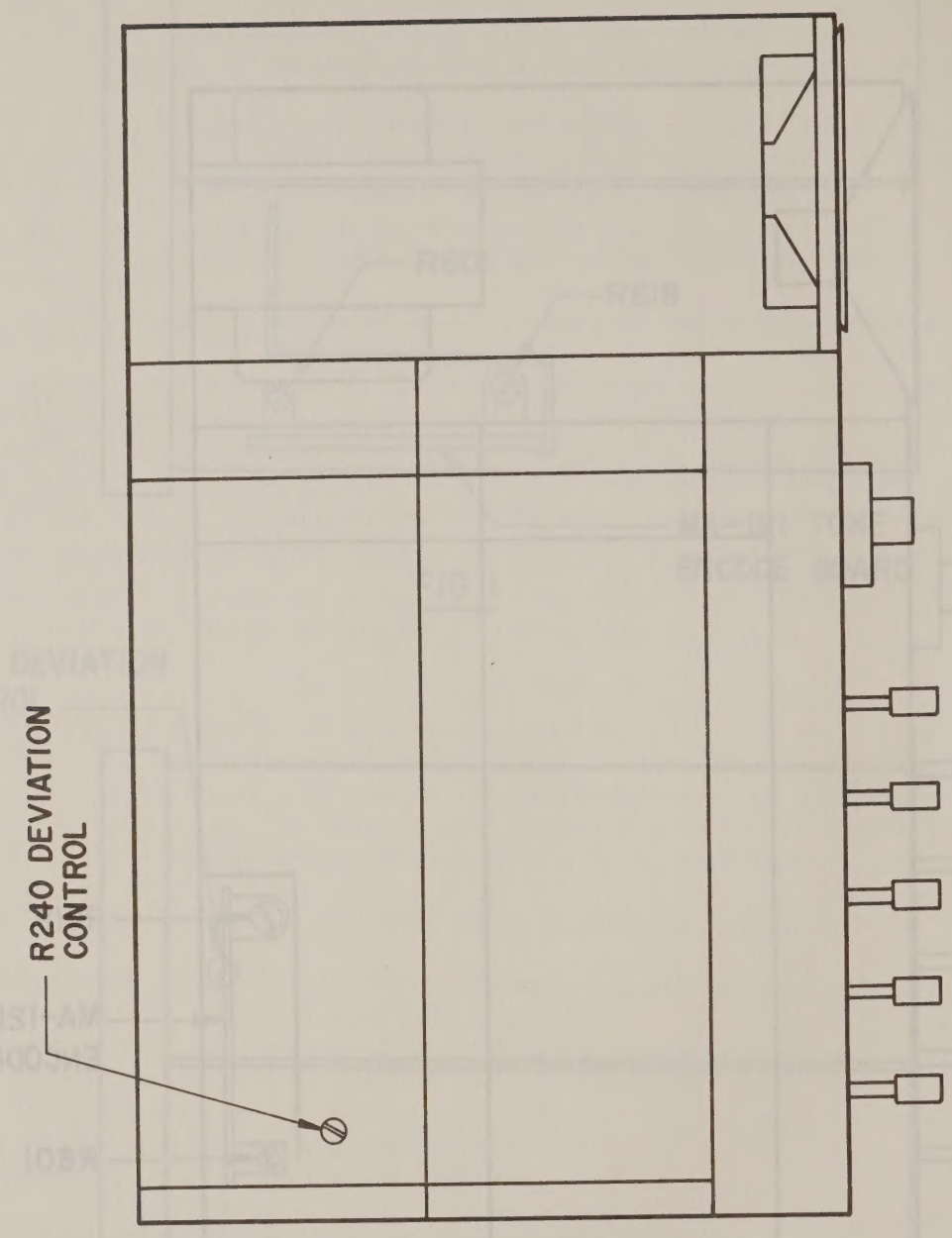


FIG 4

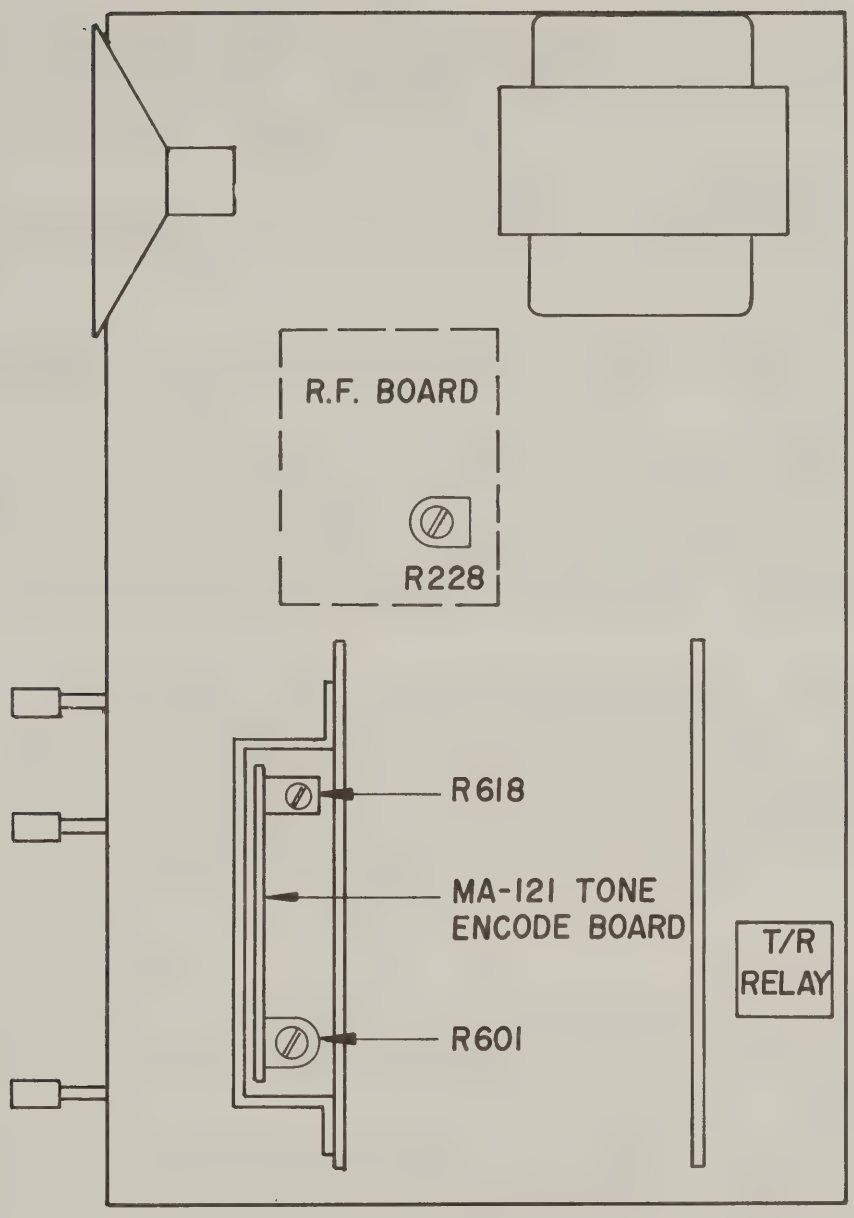


FIG 5

MA-121 TONE SQUELCH (CTCSS) OPTION

GENERAL DESCRIPTION

The Model MA-121 Tone Squelch System is supplied as a factory installed, or field installed option for a variety of Regency transceivers. This option equips the radio for encode only operation on systems using Continuous Tone Controlled Squelch Systems (CTCSS).

The circuit elements of the MA-121 tone squelch system are mounted on a plug in printed circuit board.

CIRCUIT DESCRIPTION

A block diagram of the encode only circuit board is shown on Figure 6, and a circuit diagram is shown in Figure 7.

The operating frequency of the tone system is controlled by an Active filter, consisting of IC601B, IC602A, and IC602B. This filter is a high Q, bandpass filter, that can be tuned for operation on any of the CTCSS tone frequencies. The components of the filter which determine the operating tone are precision resistors and condensers; R601, R602, R603, R604, R605, R606, R607, C601, and C602.

IC603A is an integrated circuit operational amplifier, used as a limiting amplifier. It is connected between one of the inputs and one of the outputs of the active filter described above. This limiting amplifier thus serves as a feedback path which causes the total circuit to oscillate at a frequency determined by the active filter. The limiting action of IC603 serves to keep the level of oscillation from overloading the active filter, thus keeping the output from the active filter sinusoidal.

TONE SETTING INSTRUCTIONS

The tone frequency is determined by (a) the insertion of jumpers to determine which of three bands of operation is desired, and (b) the adjustment of a precision potentiometer to determine the specific tone frequency.

For purposes of installing the jumpers, the total CTCSS frequency is divided into three bands, the low band being 67.0 Hz to 110.9 Hz; the middle band 114.8 Hz to 192.2 Hz, and the high band 203.5 Hz to 253.0 Hz.

INSTALL JUMPERS FOR THE PROPER BAND

Figure 8 shows the jumper locations. Determine which band includes the desired frequency, and insert (or remove) jumpers according to the following chart:

67.0 Hz to 110.9 Hz	Low Band	JU601,JU602,JU603,JU604 are all removed.
114.8 Hz to 192.4 Hz	Middle Band	JU601,JU603 in place. JU602,JU604 removed.
203.5 Hz to 253.0 Hz	High Band	JU602,JU604 in place. JU601,JU603 removed.

After soldering or unsoldering jumpers, at least five minutes should elapse before making any final frequency adjustment. This is necessary to permit the precision resistors and capacitors in the vicinity of the soldering points to stabilize in temperature.

Final frequency adjustment may be made with the tone board installed in the radio, or it may be made prior to installation in the radio. If adjusted outside of the radio, connect a 13.8 volt source to the tone board, with the positive terminal going to point M and the negative terminal going to point E(gnd). If adjusted inside the radio, put the unit into the "monitor and transmit" condition by lifting the microphone off the hook. Turn the tone output potentiometer R618 fully clockwise and connect the tone measuring equipment to point F. Then carefully adjust precision potentiometer R601 to obtain the wanted tone frequency. Turning R601 clockwise increases frequency.

TONE SETTING PRECAUTIONS

Accurate frequency setting is necessary on CTCSS (tone squelch) systems. When making the above frequency adjustments, be sure that you set the tone as precisely as possible. If the tone board is to operate on a system using reed type tone boards, be sure that your frequency setting is within .1 or .2 Hz if possible. Especially on reed tone systems, it is advisable to measure the tone frequency of several of the existing units; it is not safe to assume that the system is really operating on exactly the frequency stamped on the nameplates.

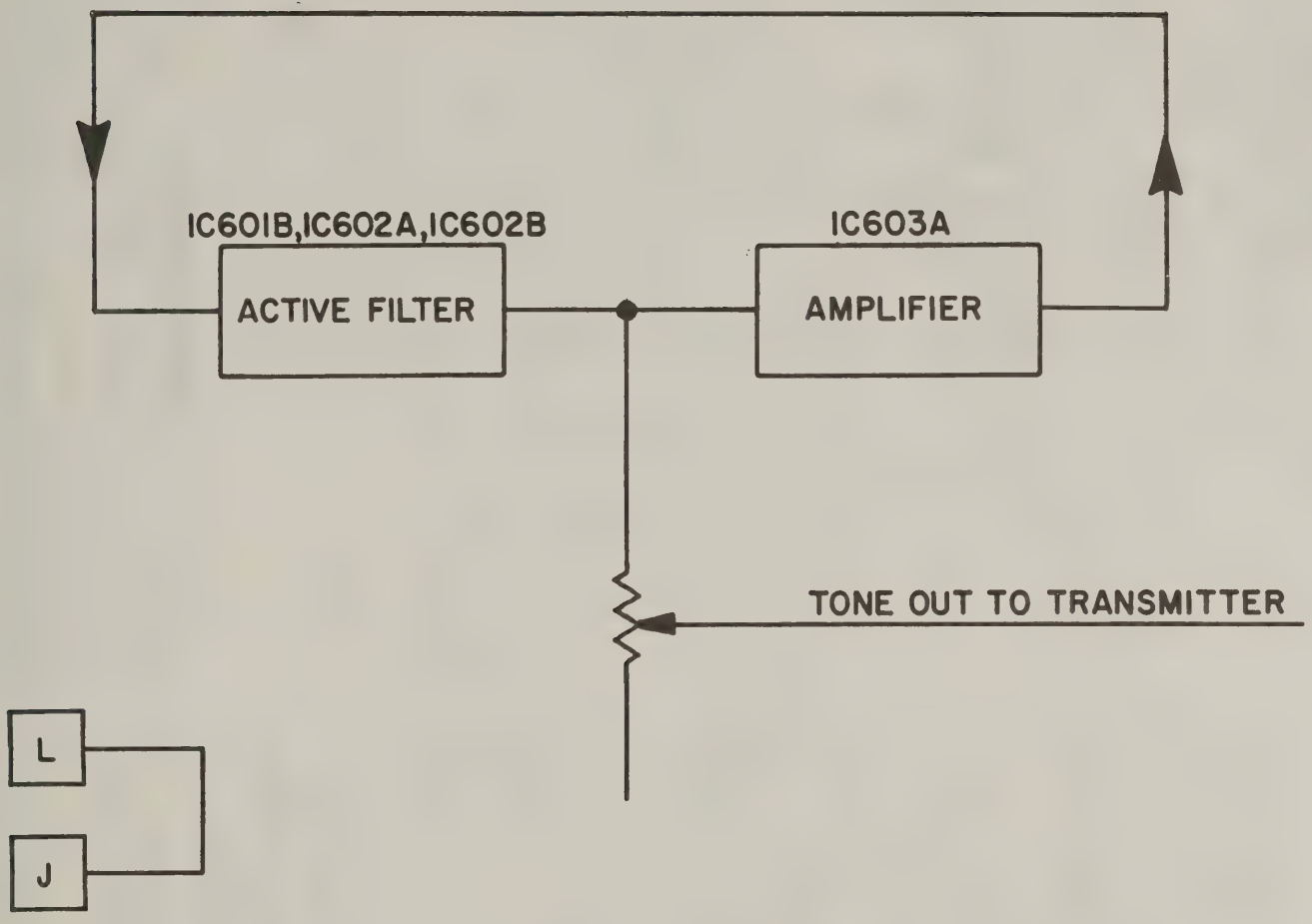
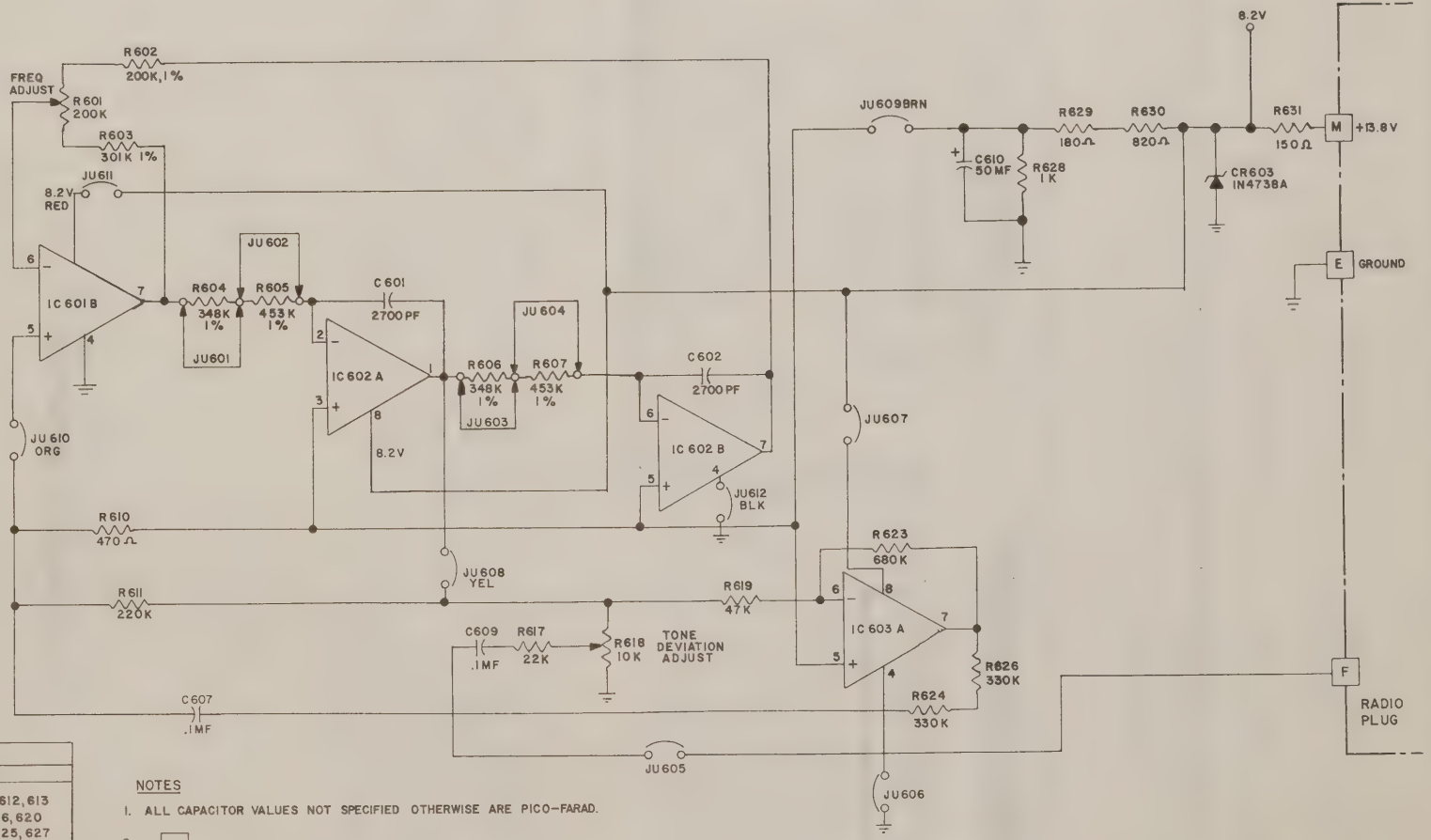


FIG. 6 BLOCK DIAGRAM

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	RELEASE 233 SJR 1-80	1 4 80	DLF



REF DESIGNATION	
LAST USED	NOT USED
JU612	R608, 609, 612, 613
R631	R614, 615, 616, 620
	R621, 622, 625, 627
C610	C603, 604, 605, 606
	C608
IC603	
CR603	CR601, 602

NOTES

1. ALL CAPACITOR VALUES NOT SPECIFIED OTHERWISE ARE PICO-FARAD.
2. □ DENOTES CIRCUIT TIE POINT.
3. ○ ○ DENOTES SOLDERED IN JUMPERS.
4. ____ - ____ INDICATES BOARD BOUNDARIES.
5. THIS SCHEMATIC IS USED IN CONJUNCTION WITH P.C. BOARD 504-046 A/B MANUFACTURED PRIOR TO JANUARY 1980.

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE: FRACT ± DEC. .XX ± .XXX ± ANGLE ±	APPROVALS	DATE
			DRAWN SJR	12-79
			CHECKED	
			DFTG. SUPV.	
		MATERIAL	ENGR.	
		FINISH		
NEXT ASSY	USED ON			
APPLICATION		DO NOT SCALE DWG.		

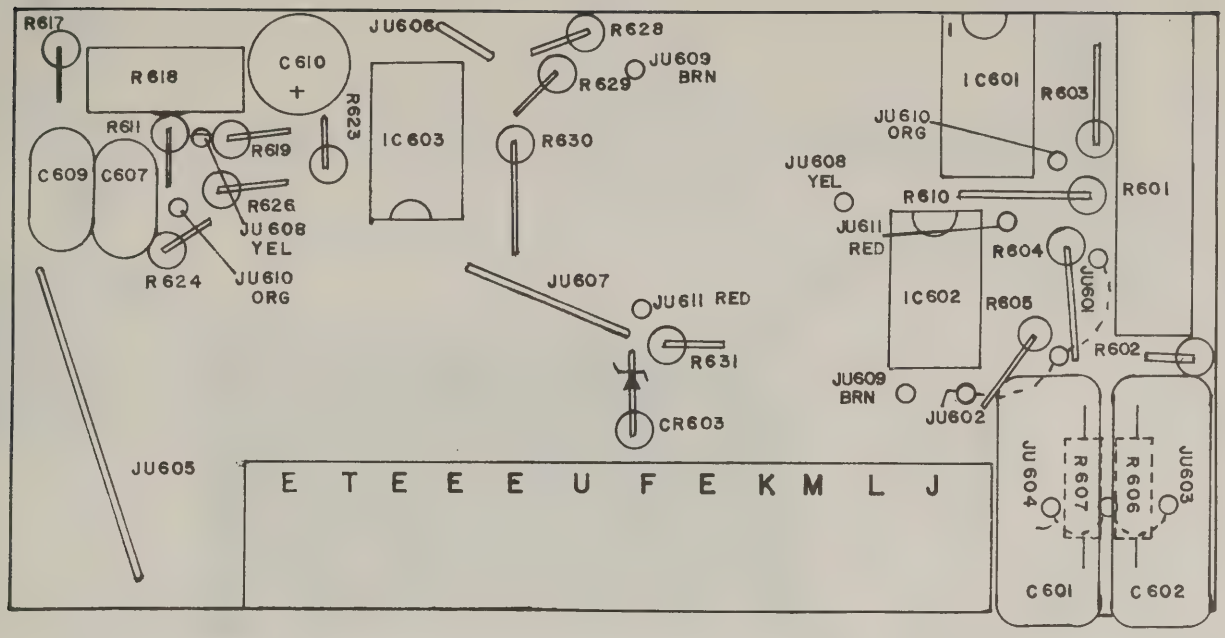
Regency® COMMUNICATIONS INC. SATELLITE BEACH, FLORIDA 32937

THIS DRAWING FOR MA-121 MANUAL ONLY

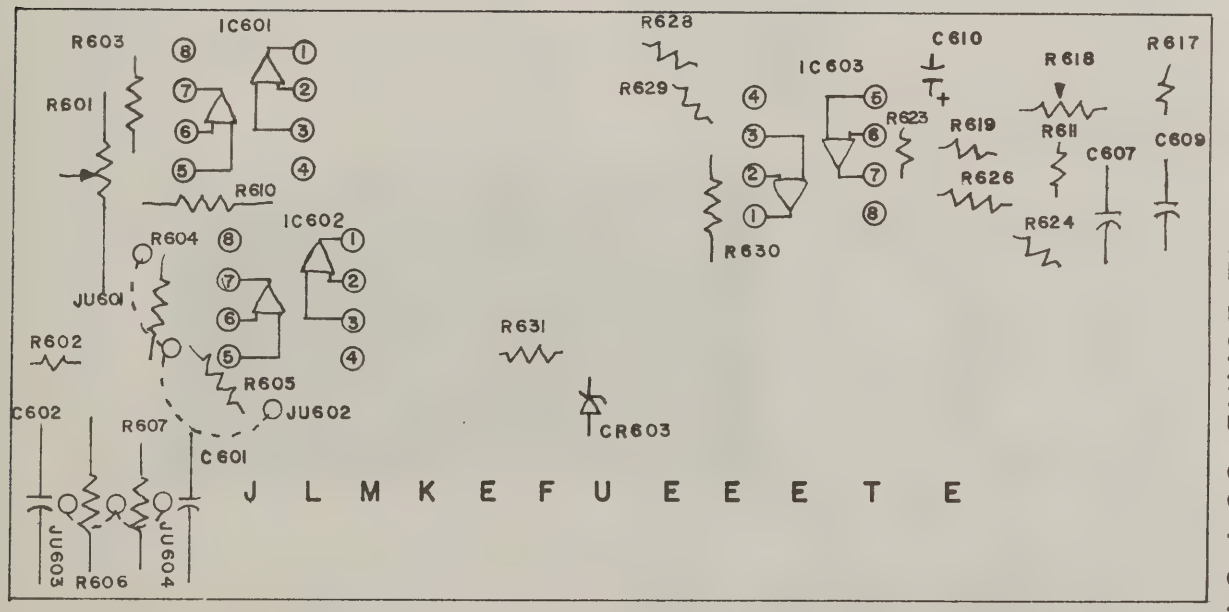
SIZE C | PART NUMBER 504-336 | REV. A | SCALE | SHEET 1 OF 1

DWG. NO. 504-336 SH. 1 REV. A

BISHOP GRAPHICS/ACCUPRESS REORDER NO. A-2307

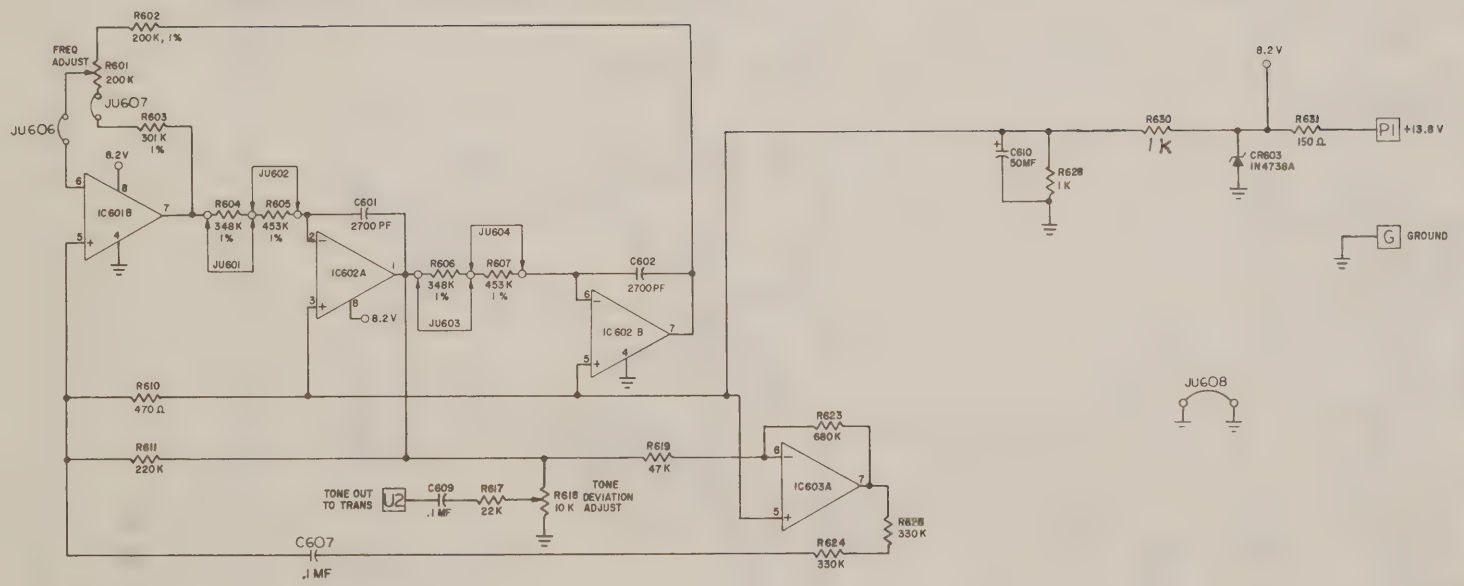


TOP VIEW



BOTTOM VIEW

FIG 8



NOTES

1. RESISTORS NOT SPECIFIED OTHERWISE ARE 1/4W, 10%.
2. FOR TONE FREQ.'S FROM 67 TO 110.9 HZ TONE OUTPUT MAY BE INCREASED BY CHANGING C609 TO .2 MF AND R617 TO 10 K.
3. FOR USE ON MCU01, 04, 11, 12, 14, 11B, 14B, 10 R, BTH 201 B—
   P1 = M
   G = E
   U2 = F

D	AA-972		
C	EN M 856 MB 8 77		
B	EN AA-199		
A			

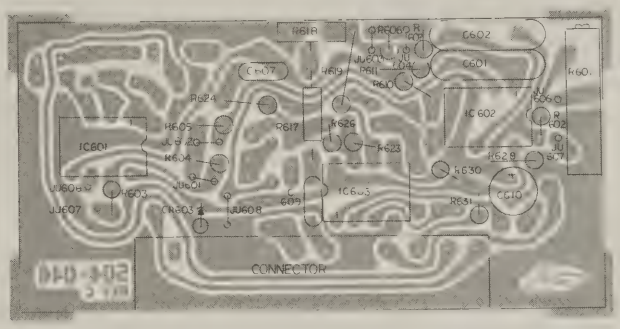
MA 121 ENCODE TONE

Regency ELECTRONICS INC INDIANAPOLIS INDIANA

DRAWN CMcC

SCHEMATIC MA 121

604-017 SH 1 OF 1 — D



NOTE:
1. USED WITH 504 046 REV.C PC BOARD ONLY.

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	R-240 SJR 1-15-80	1-17-80	DLF

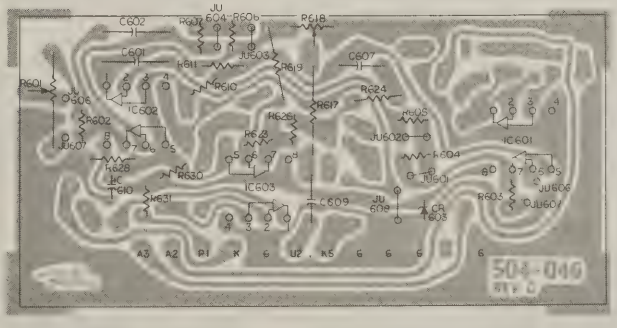
APPROVALS	DATE
DRAWN SJR	1-15-80
CHECKED	
QA'S SUPV	
MFG SUPV	1/4/80

COMMUNICATIONS INC
SATELLITE BEACH, FLORIDA 32937

PARTS PLACEMENT / SILKSCREEN
MA 121 CTCSS. ENCODE

NEXT ASSY	USED ON
	MA 21
APPLICATION	DO NOT SCALE DWG.

SIZE C | PART NUMBER | REV A
SCALE 4/1 | 504 339 | SHEET 1 OF 1



NOTE:
1. USED WITH 504-046 REV.C P.C. BOARD ONLY.

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	R-240 SJR 1-15-80	1-17-80	DLF

APPROVALS	DATE
DRAWN SJR	1-15-80
CHECKED	
QA'S SUPV	
MFG SUPV	1/4/80

COMMUNICATIONS INC.
SATELLITE BEACH, FLORIDA 32937

PARTS OVERLAY
MA-121 CTCSS. ENCODE

NEXT ASSY	USED ON
	MA-121
APPLICATION	DO NOT SCALE DWG.

SIZE C | PART NUMBER | REV A
SCALE 4/1 | 504 340 | SHEET 1 OF 1

PARTS LIST

LOCATION	DESCRIPTION	PART NUMBER
RESISTORS	(all resistors are ¼W 5% unless otherwise noted)	
R601	200K var	4751-0204-007
R602	200K res mf	4709-3402-401
R603	301K res mf	4709-3402-402
R604	348K res mf	4709-3402-403
R605	453K res mf	4709-3402-404
R606	348K res mf	4709-3402-403
R607	453K res mf	4709-3402-404
R608	not used	
R609	not used	
R610	470 ohm	4704-0474-032
R611	220K	4704-0224-032
R612 - R616	not used	
R617	22K	4704-0223-032
R618	10K var	4751-0103-002
R619	47K	4704-0473-032
R620	not used	
R621	not used	
R622	not used	
R623	680K	4704-0684-032
R624	330K	4704-0334-032
R625	not used	
R626	330K	4704-0334-032
R627	not used	
R628	1K	4704-0102-032
R629	180 (not used in Rev C Bd.)	4704-0101-032
R630	820	4704-0821-032
R630 (Rev. C Bd.)	1K	4704-0102-032
R631	150 res comp ½W 10%	4700-0151-042
CAPACITORS		
C601	2700pf 5%	1504-0272-505
C602	2700pf 5%	1504-0272-505
C603 - C606	not used	
C607	.1mf 12V	1502-0104-006
C608	not used	
C609	.1mf 12V	1502-0104-006
C610	47mf 10V	1513-0470-001
INTEGRATED CIRCUITS		
IC601	TL-082/LF353N	3130-3167-912
IC602	TL-082/LF353N	3130-3167-912
IC603	LM358N	3130-3167-909
DIODES		
CR603	IN4738A	4808-0000-009

Regency® COMMUNICATIONS INC.

SERVICE INSTRUCTIONS

TWO TONE SEQUENTIAL DECODER

MODEL MA-123

1227 S. PATRICK DR.
SATELLITE BEACH, FLORIDA

0300-4087-200

PRINTED IN U.S.A.
8-80

SERVICE INSTRUCTIONS
REGENCY MA-123
TWO TONE SEQUENTIAL DECODER

A. GENERAL DESCRIPTION

The Regency Two Tone Sequential Decoder(TTS) option is designed for use with tone controlled squelch systems where two tones are transmitted sequentially. It is available as a factory installed option or as a kit for Regency transceivers.

The MA-123 can be used as an all call decoder, as a selective call decoder or as both, depending on the tone filter frequencies selected.

The decoder block diagram is shown in Figure 2, parts layout in Figure 3, and schematic in Figure 4.

B. CIRCUIT DESCRIPTION (Refer to Figure 1 and Figure 3)

TONE RECEIVING CONDITION

The initial conditions in this mode is that the receiver is squelched, the message lamp is off, and the microphone is on-hook (microphone in the hang-up clip).

Audio enters at point AØ. Then is inputed to an audio amplifier at Pin 2 of IC1103 where it is amplified and outputed at Pin 1. The amplifier output is connected to three parallel reed filters.

These filters are electro-mechanical resonating devices. The output amplitude is determined by the resonant frequency of the filter element. This frequency is marked on each filter.

The filter outputs are divided into two groups. FL1101 is used for the detection of the first tone. FL1102 and FL1103 are used for the detection of either one of two second tones in the two-tone sequence.

The outputs of FL1102 and FL1103, like the output of FL1101, are amplified by two stages of amplification from IC1101. The amplified output of FL1101 can be seen on Pin 2 of IC1101, whereas the output of filters FL1102 and FL1103 can be seen at Pin 10 of IC1101.

Each of these amplified outputs are rectified and filtered. This supplies a DC level for the logic circuits to evaluate. When a tone corresponding to FL1101's resonant frequency is detected Pin 12 of IC1102 goes high(approx. 3 volts or greater), this logic signal is called TONE 1. If FL1102 or FL1103 detects a tone, the cathode of CR1104 will go high, this logic signal is called TONE 2.

The TONE 1 signal triggers a 2½ second one-shot. The one-shot is a discrete one-shot consisting of an R-C time constant, an OR gate, and an inverter. A high at Pin 12 of IC1102 causes Pin 11 to go low. This allows the uncharged C1109 to charge. The voltage at Pin 13 of IC1101 will go low when Pin 11 of IC1102 goes

low and will increase, corresponding to C1109 charging up. While Pin 13 of IC1101 is low the output, Pin 12, will be high. This output is fed back to the other input of the OR gate to hold Pin 11 of the gate low allowing C1109 to continue to charge and is also the output of the one-shot. This output is connected to one input of a 3-input AND gate thru CR1109.

Besides firing a one-shot, the TONE 1 signal is also inverted creating the TONE 1 signal. This is connected to the second input of the 3-input AND gate thru CR1103 and CR1108.

Finally, the TONE 2 signal is inputed to the third input of the 3-input AND gate thru CR1108.

The 3-input AND gate is formed by ½ of IC1103 and the diode arrangement of CR1103, CR1108 and CR1109 with a pull-up resistor, R1123. When all three inputs are high then Pin 5 of IC1103 will go high. With pins above the threshold voltage of 4V on Pin 6, the output(Pin 7) will be high.

Summarizing the decoding sequence, when the first tone is received a one-shot is triggered. If the second tone is then received with the one-shot output still high and the first tone not present, the output of the AND gate will go high. This output is available at point D9.

With the microphone on-hook, Pin 6 of IC1102 will be low. When the proper tone sequence is received, Pin 1 of IC1102 will go high, setting the S-R latch. This sets the latch with Pin 3, $\overline{Q}$ output, going low, and Pin 4, Q output, going high. When $\overline{Q}$ goes low Q1102 is turned off allowing K8 to go high. The Q output of the latch is available at point D1 and also turns on Q1101, which provides an open-collector output at DØ.

TRANSMITTING CONDITION

In this mode the microphone is off-hook (removed from hang-up clip). With the microphone off-hook the radio operates normally. Point K5 goes high, removing the ground from the emitter of Q1102, allowing the squelch circuit to operate normally. When K5 goes high it also resets the S-R latch, resetting the message lamp driven by DØ.

C. INSTALLATION

Plug the jumper kit onto the option board by matching the pin symbols with the sleeves on the wired receptacles (see Figure 3).

Mount the option board as shown in Figure 5, using the two sheet metal screws supplied (insert the screws from the foil side of the board).

Remove jumper JO205 from the radio. Insert the receptacles to the proper pins (see Figure 5) by matching the pin symbols in the radio with the sleeves on the wired receptacles.

Two TTS Decoder boards can be installed so the transceiver can decode up to four possible tone sequences. To accomplish this connect the first tone board as described above. Connect the second tone board, using the connecting pins supplied, as follows:

1) Connect a JO jumper from P1 in the radio to P1 on the second TTS board.

2) Connect a JO jumper from G in the radio to G on the second TTS board.

3) Connect the two AØ pins between the two decoders using a JO jumper.

4) Connect the two D9 pins between the two decoders using a JO jumper.

NOTE: Enough receptacles are supplied for the construction of the JO jumper assemblies for the optional variations of the option.

D. ADJUSTMENT PROCEDURE (No adjustments are necessary but the following performance should be observed.)

When the microphone hang-up button is not grounded the radio should operate normally. When the hang-up button is grounded the receiver will squelch and the message lamp will be off.

When a modulated signal, modulated with the correct tone sequence (described below), is received, the message lamp will illuminate and the receiver will operate normally.

PROPER TONE SEQUENCE:

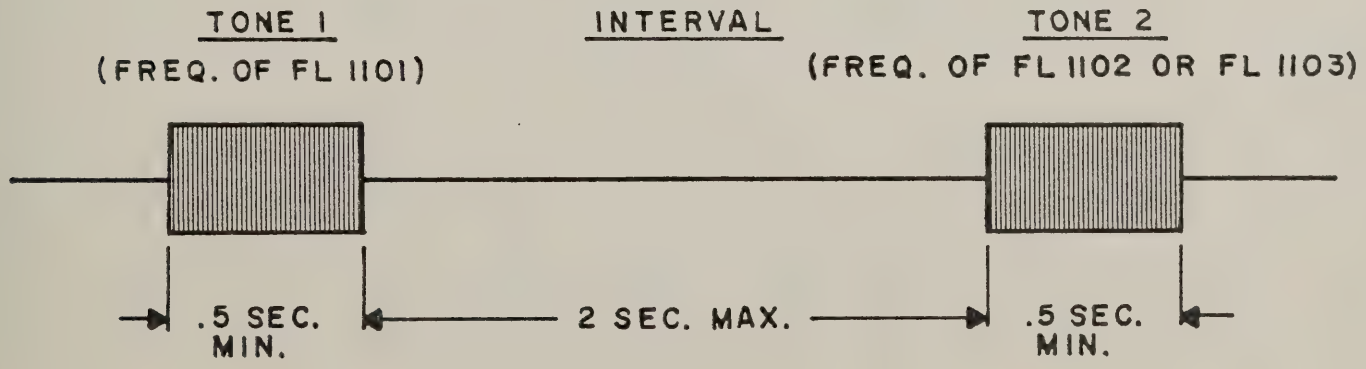


FIGURE 1

E. SPECIFICATIONS

Voltage Range	12-24 VDC
Current Drain	25ma max. (18ma typ.)
Frequency Range	300 Hz - 1050 Hz (Separated into selected frequency groups for Regency on-call systems. Three Frequency Groups: Z - Code, A - Code, B - Code
Bandpass	±.35%
Inputs	
AØ Audio Input	.2 - 1 VRMS
D9 Message Latch Set	5v max.(Set)
K5 Message Latch Reset	0v min. Open or 5v max.(Reset)
Outputs	
DØ Message Lamp Driver	30ma Sink max.
D1 Message Latch Q Output	1ma Source max.
D9 Decode Output(momentary)	10ma Source max.
K8 Squelch Control	.4ma Sink max.
Signal(Two Sequentail Tones)	
1st Tone Duration	Greater than .5 sec.
Interval Duration	Less than 2 sec.
2nd Tone Duration	Greater than .5 sec.
Sensitivity	6dB SINAD (max.)

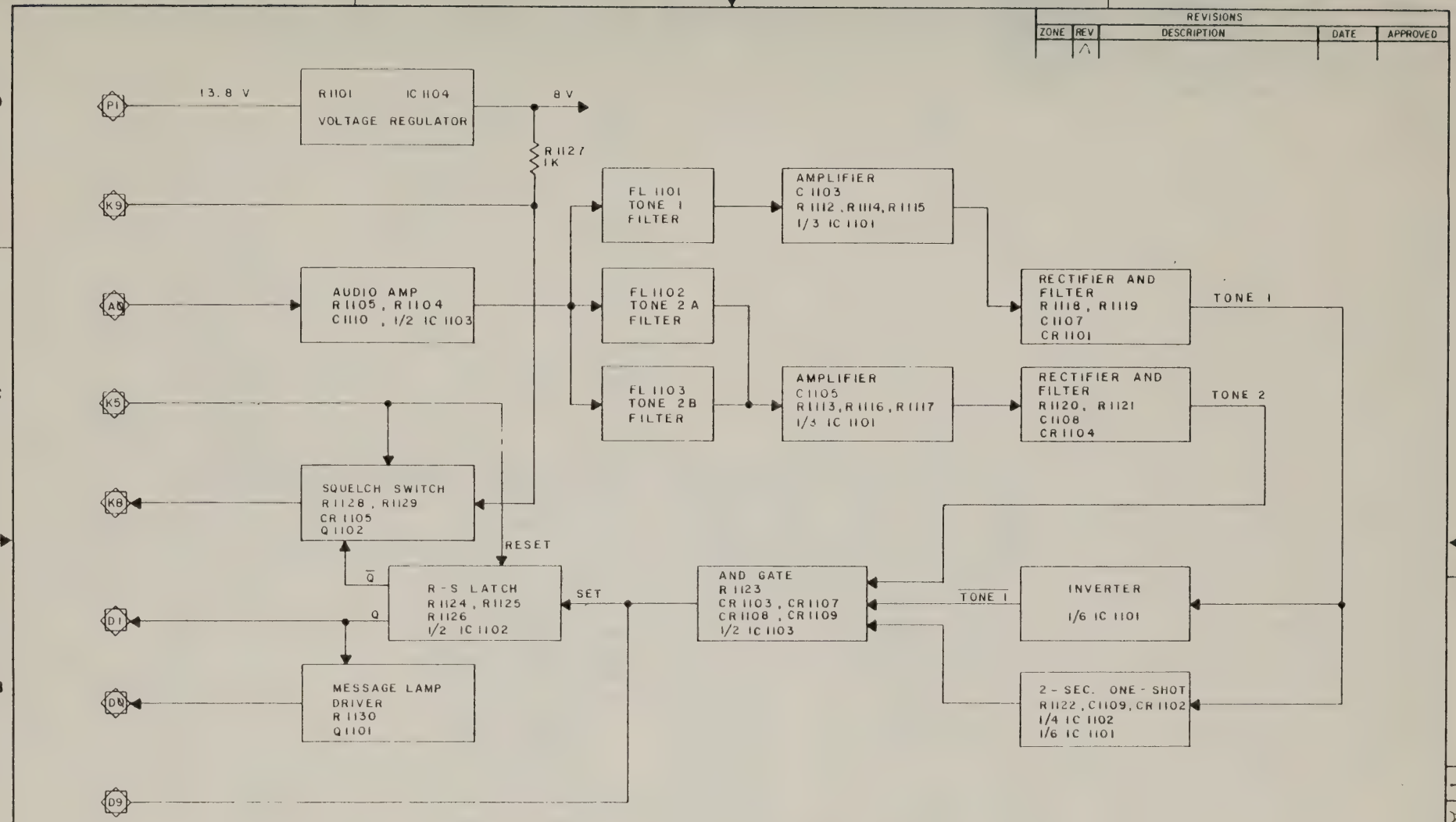
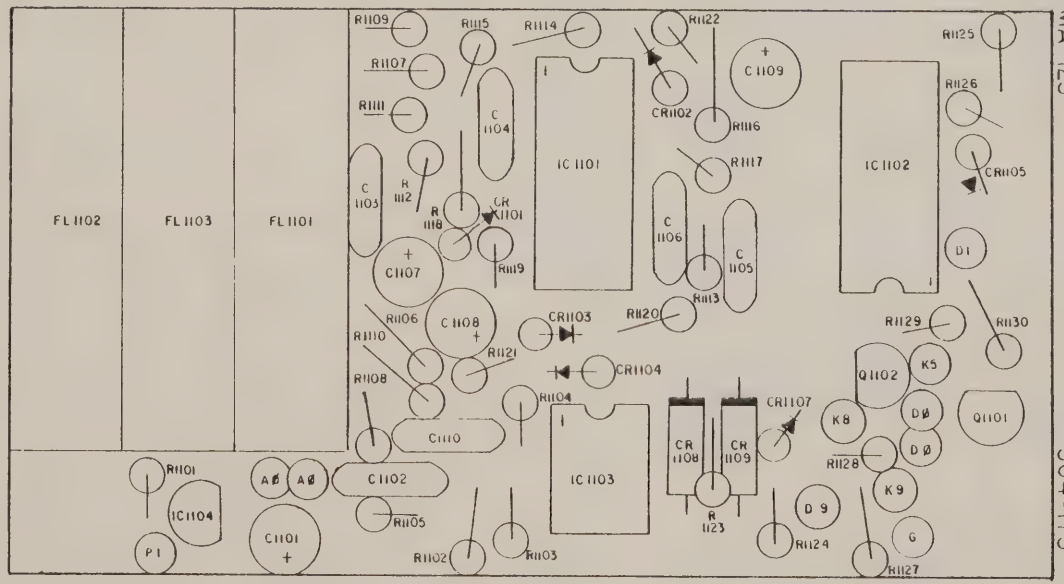

REVISIONS
ZONE REV DESCRIPTION DATE APPROVED
P1
13.8 V
R1101 IC 1104
VOLTAGE REGULATOR
8 V
R1127
1K
K9
AO
AUDIO AMP
R1105, R1104
C1110, 1/2 IC 1103
FL 1101
TONE 1
FILTER
FL 1102
TONE 2A
FILTER
FL 1103
TONE 2B
FILTER
AMPLIFIER
C1103
R1112, R1114, R1115
1/3 IC 1101
AMPLIFIER
C1105
R1113, R1116, R1117
1/3 IC 1101
RECTIFIER AND
FILTER
R1118, R1119
C1107
CR1101
TONE 1
RECTIFIER AND
FILTER
R1120, R1121
C1108
CR1104
TONE 2
K5
K8
SQUELCH SWITCH
R1128, R1129
CR1105
Q1102
RESET
Q
R-S LATCH
R1124, R1125
R1126
1/2 IC 1102
SET
AND GATE
R1123
CR1103, CR1107
CR1108, CR1109
1/2 IC 1103
TONE 1
INVERTER
1/6 IC 1101
D1
MESSAGE LAMP
DRIVER
R1130
Q1101
DN
2-SEC. ONE-SHOT
R1122, C1109, CR1102
1/4 IC 1102
1/6 IC 1101
D9
NEXT ASSY
USED ON
APPLICATION
DO NOT SCALE DWG
APPROVALS
DATE
DRAWN
CHECKED
QUALITY SUPV
ENGR
MATERIAL
FINISH
Regency
COMMUNICATIONS INC
SATELLITE BEACH, FLORIDA 32937
BLOCK DIAGRAM
CODEK
SIZE C
PART NUMBER 504-4
REV A
SCALE
SHEET 1 OF 1

FIGURE 2



A	5-04-78		REFERENCE	Regency ELECTRONICS INC INDIANAPOLIS, INDIANA 46226	
REV.	DATE	CHANGE	TTS DECODER MA 123	UNLESS OTHERWISE SPECIFIED DEC ± FRACT ± ANGLES ± SCREW THREADS AMERICAN NATIONAL CLASS	
				SCALE 4:1 DRAWN WWL 1-3-78 CHECKED	
				TITLE PARTS PLACEMENT	
				DRAWING NO 504-175 REV A	

FIGURE 3A

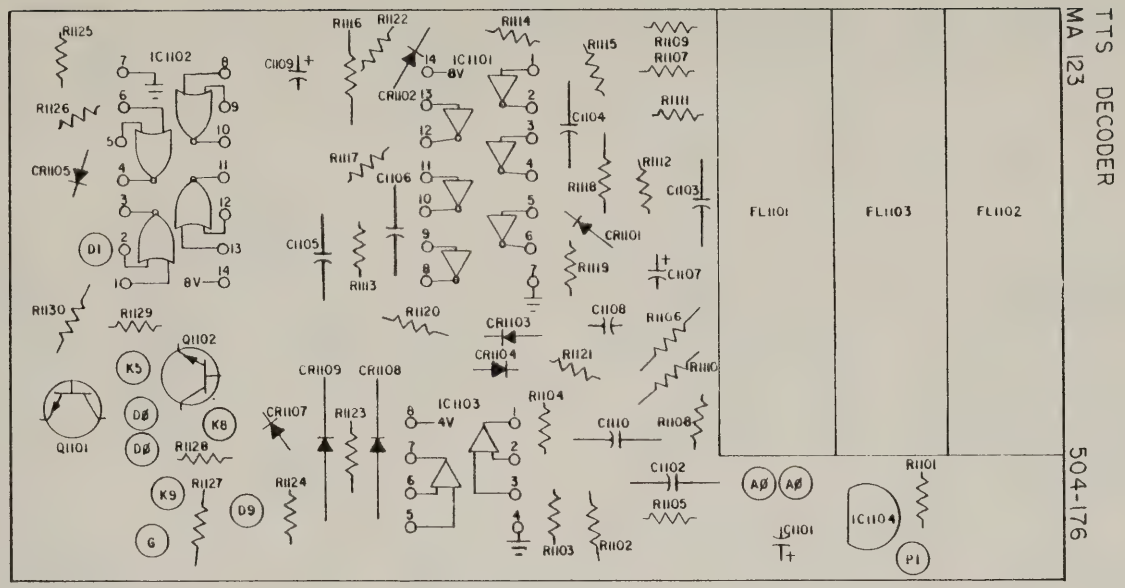


FIGURE 3B

A	E-104 4-20-78			REFERENCE: TTS DECODER MA 123	Regency ELECTRONICS INC INDIANAPOLIS INDIANA 46226
REV	CHANGE	DATE			UNLESS OTHERWISE SPECIFIED DEC ± FRACT ± ANGLES ± SCREW THREADS AMERICAN NATIONAL CLASS
					SCALE 4:1 DRAWN WWM 1-5-78 CHECKED
					TITLE: PARTS OVERLAY
					DRAWING NO 504-176 REV A

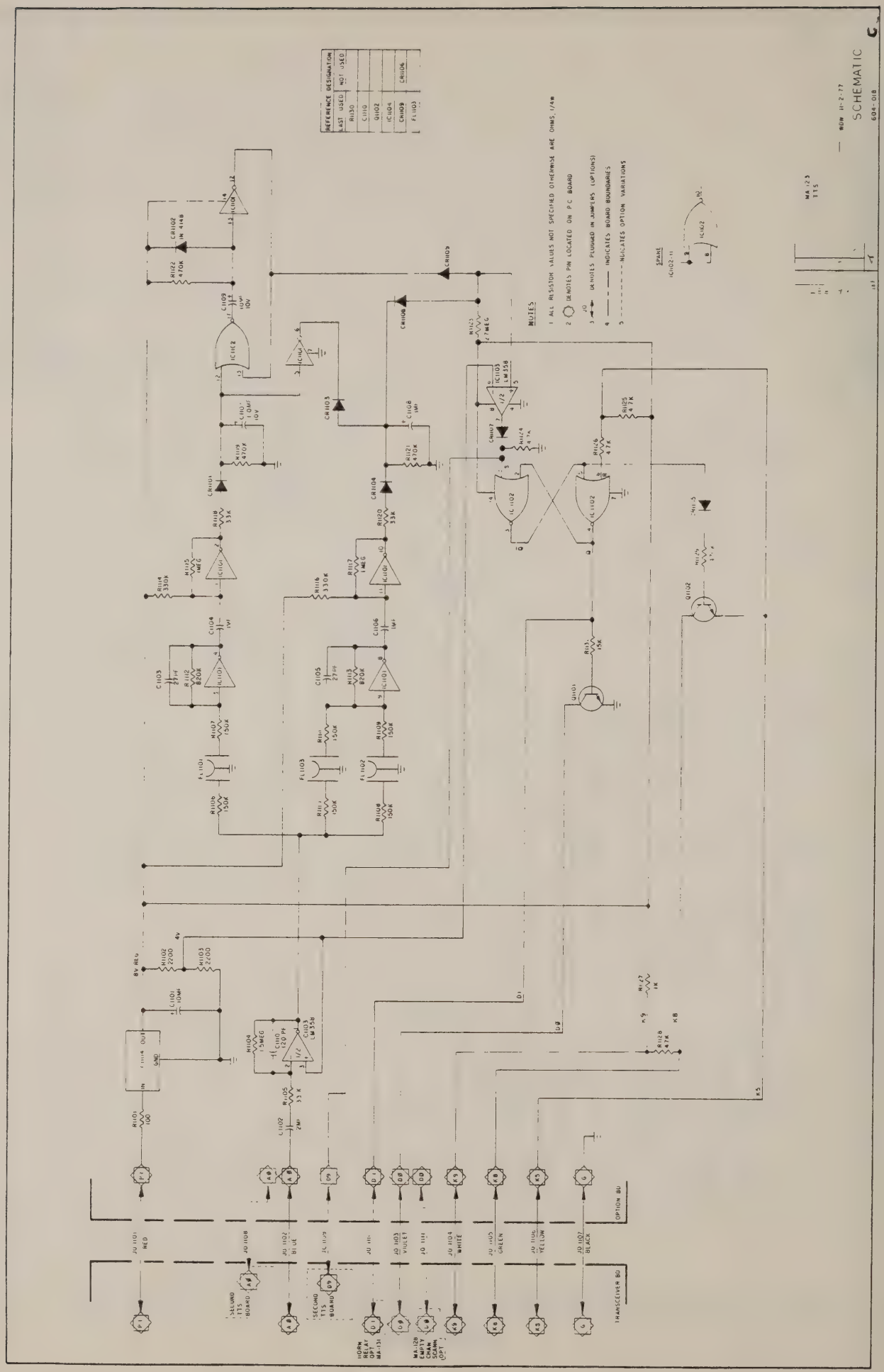

SCHEMATIC
NOTES
1 ALL RESISTOR VALUES NOT SPECIFIED OTHERWISE ARE OHMS, 1/4W
2 DENOTES PIN LOCATED ON P C BOARD
3 DENOTES PLUGGED IN JUMPERS (OPTIONS)
4 INDICATES BOARD BOUNDARIES
5 INDICATES OPTION VARIATIONS
REFERENCE DESIGNATION
LAST USED
NOT USED
R130
C110
Q102
IC1104
CR1109
CR1106
FL1103
8V REG
4V
OPTION BU
TRANSCEIVER BU
SECOND TTS BOARD
HORN RELAY OPT MA-131
MA-120 EMPTY CAM SCANN OPT
MA-123 TTS

FIGURE 4

RADIO INTERFACE DIAGRAM

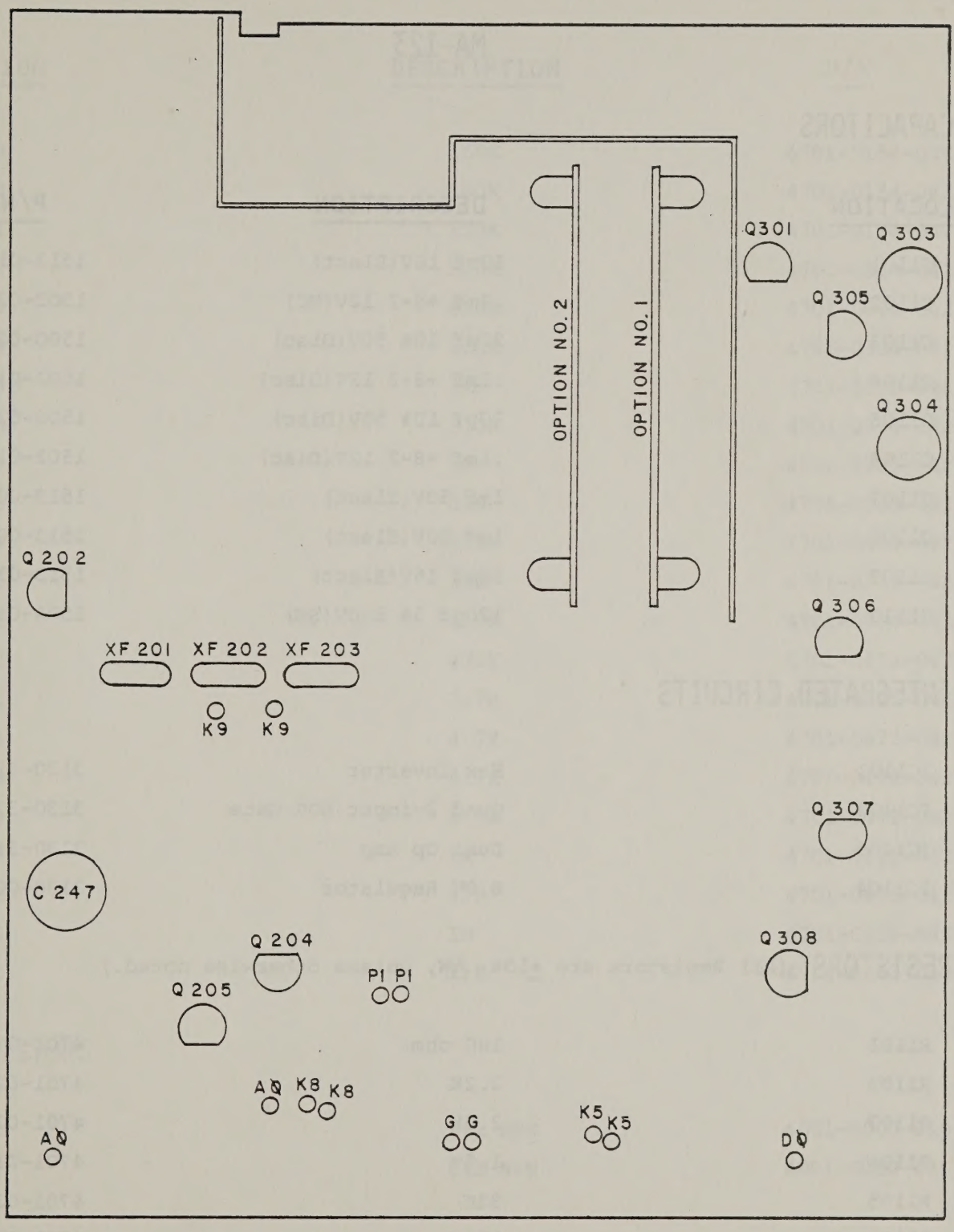


FIGURE 5

PARTS LIST

MA-123

CAPACITORS

LOCATION	DESCRIPTION	P/N
C1101	10mf 16V(Elect)	1513-0100-002
C1102	.2mf +8-2 12V(MC)	1502-0204-006
C1103	27pf 10% 50V(Disc)	1500-0270-650
C1104	.1mf +8-2 12V(Disc)	1502-0104-006
C1105	27pf 10% 50V(Disc)	1500-0270-650
C1106	.1mf +8-2 12V(Disc)	1502-0104-006
C1107	1mf 50V(Elect)	1513-0010-002
C1108	1mf 50V(Elect)	1513-0010-002
C1109	10mf 16V(Elect)	1513-0100-002
C1110	120pf 5% 500V(SM)	1504-0121-505

INTEGRATED CIRCUITS

IC1101	Hex Inverter	3130-3157-617
IC1102	Quad 2-input NOR Gate	3130-3157-627
IC1103	Dual Op Amp	3130-3167-909
IC1104	8.0V Regulator	3130-0000-014

RESISTORS (All Resistors are ±10%, ¼W, unless otherwise noted.)

R1101	100 ohm	4701-0101-042
R1102	2.2K	4701-0222-042
R1103	2.2K	4701-0222-042
R1104	1.5M	4701-0155-042
R1105	33K	4701-0333-042
R1106	150K	4701-0154-042
R1107	150K	4701-0154-042
R1108	150K	4701-0154-042

RESISTORS (cont.)

LOCATION	DESCRIPTION	P/N
R1109	150K	4701-0154-042
R1110	150K	4701-0154-042
R1111	150K	4701-0154-042
R1112	820K	4701-0824-042
R1113	820K	4701-0824-042
R1114	330K	4701-0334-042
R1115	1M	4701-0105-042
R1116	330K	4701-0334-042
R1117	1M	4701-0105-042
R1118	33K	4701-0333-042
R1119	470K	4701-0474-042
R1120	33K	4701-0333-042
R1121	470K	4701-0474-042
R1122	470K	4701-0474-042
R1123	2.7M	4701-0275-042
R1124	4.7K	4701-0472-042
R1125	4.7K	4701-0472-042
R1126	4.7K	4701-0472-042
R1127	1K	4701-0102-042
R1128	47K	4701-0473-042
R1129	1M	4701-0105-042
R1130	15K	4701-0153-042

TRANSISTORS

Q1101	Sil NPN	4801-0000-010
Q1102	Sil NPN	4801-0000-010

DIODES

CR1101-CR1105	Sil	4805-1241-200
CR1107-CR1109	Sil	4805-1241-200